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Diagnostic Criteria for Depression in the Elderly

by

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A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfillment of the requirements for the degree of Master of Science

Department of Psychiatry

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Abstract

A prevalence study of psychiatric disorders in the elderly was conducted in which 1119 community residents 65 years of age or older were administered the Geriatric Mental State (GMS). The GMS is widely used in Europe, has been validated against psychiatrists, and makes diagnoses according to AGECAT criteria. There were 143 cases of GMS/AGECAT depression, giving a (weighted) prevalence rate of 11.3 %. This is similar to European studies, but much larger than reports based on North American studies based on DSM-III diagnostic criteria. In our sample, somatic symptoms were much more frequent than cognitive or dysphoric symptoms in cases of depression. We hypothesized that the large prevalence rate was due to the manner in which GMS/AGECAT processes somatic symptoms. GMS questionnaires were recoded to nullify the effect groups of symptoms. Prevalence rates were recomputed. Nullifying the effect all somatic symptoms reduced the number of cases to 128. Voiding all cognitive symptoms of depression brought the number of cases to 142. Removing the effect of all dysphoric symptoms of depression drastically reduced the number of cases to 24. The most important symptoms to the GAGE diagnosis of depression were those relating to dysphoria. A logistic regression analysis supported the importance of dysphoric symptoms. The GMS/AGECAT system tends to diagnose mild cases of depression, and places greater emphasis on dysphoric than cognitive or somatic symptoms of depression. Somatic symptoms do not account for the large number of GMS/AGECAT cases of depression.

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Chapter 1

Introduction and Review of the Literature

1. Introduction

Depressive symptoms and syndromes in the geriatric population have sparked interest in researchers of the past two decades, in part due to disparate estimates of its prevalence. Conventional wisdom suggests that the accumulation of stressors throughout the life span predicts a high prevalence of depression in this population. Recent research, discussed herein, suggests that this may not be true; the interface between older age and depression may be more complex. As the proportion of older people continue to grow, the issues surrounding geriatric depression will rise in importance.

Numerous epidemiologic research efforts have been launched to investigate the true nature of depression in the elderly. Epidemiology, the study of the distribution and causes of illness (Tohen and Goodwin, 1995), has been used by these investigators as a tool to clarify clinical concepts and measure the "true" burden of these disorders on this older population. Traditionally, epidemiology was not applied to noninfectious nor chronic disorders (including psychiatric disorders). However, epidemiological methods are increasingly being applied to psychiatry to clarify concepts of caseness, delineate risk factors, evaluate interventions and ultimately reduce the morbidity of depressive disorders.

Morris (1957), cited in Blazer (1994), described the domain of epidemiology as a set of tasks to complete the clinical picture of a disease. These tasks include: the identification of cases, examining the distribution of cases in the population, charting historical trends, the identification of causes, plotting the typical course of a disease, and finally, analyzing utilization patterns of clinical services. An understanding of all of these areas is fundamental to determine the true burden of a health problem on a population, and the creation of public policies regarding the structure and financing of clinical services. The following will discuss each of these six points, focusing on the community-dwelling geriatric population suffering from major depressive disorder (MDD).

1.1 Identification of cases - identifying and clarifying syndromes

Clear definitions of casesness are essential to the epidemiologic study of depression. In psychiatry, the diagnostic process relies on several steps. These steps include the clinical description of the disease, the development of reliable and reproducible laboratory tests, as well as the execution of family studies (including twin and adoptee studies) and longitudinal studies to measure the natural course of the disorder (Bland and Kolada, 1988).

Troublesome, though, to the conceptualization of major depressive disorder is the controversy concerning the distinction between MDD and other depressive illnesses. Some investigators consider all depressive disorders to belong to a continuum or to a spectrum of severity. When depressive disorders are so considered, they are typically measured by self-rated or observer rating scales. "Depression",

then, is diagnosed when the symptom count exceeds an already determined cut-off. Other researchers suggest that depressive illnesses exist as discrete and clinically distinct entities, with specific diagnostic criteria. Each of MDD, dysthymia, adjustment disorder with depressed mood, organic mood syndrome, depression not otherwise specified and recurrent brief depression (RBD), for example, have a separate set of criteria in the fourth edition of the Diagnostic and Statistical Manual (DSM-IV).

Unfortunately, no consistent laboratory tests exist for the identification of major depressive disorders, although the dexamethasone test (DST) and shortened REM latency may have some utility, though they lack specificity (Allen and Blazer, 1991). Reduced platelet tritiated imipramine binding may act as a biological maker for depression, though this is still experimental. For the most part, however, the operational definition of depressive disorders has relied upon clinical observation and the collection of symptomatic data.

1.1.1Review of several diagnostic instruments

Recently created standardized diagnostic criteria have made possible advances in the understanding of the epidemiology of depressive disorders. A selected overview of diagnostic systems is made here. The Research Diagnostic Criteria (RDC) (Spitzer et al., 1978), the third, third revised and fourth editions of the Diagnostic and Statistical Manual (DSM) (American Psychiatric Association, 1994), as well as the tenth edition of the International Classification of Diseases (ICD) (Cooper, 1994) have allowed the collection of large data sets. With these tools, the

study of the distribution and determinants of disease has come closer to producing consistent prevalence estimates of depressive disorders. All of these advances to the operational definition of depression, as well, have facilitated communication between researchers.

As well, standardized interview instruments complement the above diagnostic criteria, including the Diagnostic Interview Schedule (DIS) (Robins et al., 1981) and the Schedule for Affective Disorders and Schizophrenia (SADS-L) (Endicott and Spitzer, 1978) and the Composite International Diagnostic Interview (CIDI) (Essau and Wittchen, 1993). Efforts to standardize diagnostic interview instruments have taken place in the United Kingdom, including the Present State Examination (PSE) (Wing et al., 1974). The Geriatric Mental State (GMS) examination (Copeland et al., 1976) was developed from the PSE. These two British instruments, the PSE and the GMS, have their own diagnostic criteria: CATEGO and AGECAT, respectively.

Rating scales, both interviewer-completed as well as self-completed, are important as economical screening tools. The interview schedules, described above, require at least a trained lay interviewer, while most rating scales require very little training or expense to deliver. The rating scale, Center for Epidemiological Study - Depression (CES-D) scale (Radloff, 1977), was designed to screen for depression in very large community samples. Some scales are designed to be sensitive to change in symptoms in subjects known to have depression, for example, the Montgomery-Åsberg scale (Montgomery and Åsberg, 1979). Such a scale may be useful, as it measures not the disability's absolute severity but instead the change in functional status over time, which is important, for example, for studies of treatment efficacy.

The Geriatric Depression Scale (GDS) (Yesavage et al., 1983), designed specifically for use in the geriatric population, excludes measures of somatic symptoms of depression, since ordinary symptoms of aging may overlap with somatic symptoms of depression. The GDS is easy to complete, in an effort to increase compliance in the elderly population. It is considered appropriate for cognitively intact and impaired elderly patients (Burke et al., 1992).

1.1.2 Phenomenology of depressive disorders across the life span

Blazer (1990) suggested that the operational definition of depressive syndromes might be applicable over the life span, requiring a similar approach to diagnostics and therapeutics. There is some evidence, however, to suggest that the manifestation of late-onset depression is distinct from that in early-onset depression. Baron et al. (1981) showed that genetic contributions are weaker for older relatives of unipolar probands. As well, structural changes are more common in late-onset depression (Blazer et al., 1994). Furthermore, Carlson and Kashani (1988) measured the frequency of depressive symptoms in four age groups. This work pointed out that anhedonia (loss of interest), diurnal variation, hopelessness, psychomotor retardation and delusions increased with age. Depressed appearance, low self-esteem and somatic complaints decreased with age. On the other hand, in a study comparing depressive phenomenology in adult and elderly participants (Krishnan et al., 1995), elderly cases had more somatic complaints. Using a logistic regression model, this work found that the presence of loss of interest predicted late-onset depression. Koenig et al. (1993) found that among older men, loss of interest, insomnia, and

suicidal thoughts distinguished depressed from non-depressed cases, which was different for younger male subjects. Manifestation of depression, then, may vary with age, despite Blazer's (1990) suggestions.

1.1.3 Proposed revision of diagnostic criteria to include new depressive categories

There may be a need for revised diagnostic criteria, due to atypical presentations of depressive symptomalogy in the elderly population. Blazer et al. (1989) suggested that current classification schemes do not precisely describe the high frequency of elderly depressed patients who narrowly miss depressive diagnoses. These elderly depressed instead fall into atypical or residual categories. Using grade-of-membership analysis, Blazer et al. (1989) found a cluster of symptoms almost entirely unique to older subjects. This cluster consisted of many depressive symptoms, but not established syndromes of depressive disorders. Blazer (1991) suggested that this cluster of minor depression might be unique to late-life, and associated with physical illness and cognitive difficulties. Snaith (1987) explored the concept of mild depression; he suggested that it is usually of endogenous origin, and that it may abound in community dwelling adults. Tannock and Katona (1995) proposed that "minor" or subsyndromal depression, encompassing a collection of less severe though clinically significant depressive symptoms, be identified as a distinct diagnostic entity. Minor depression, distinct from dysthymia would have fewer core symptoms, and would not have to be present for the same length of time. As discussed in Angst et al. (1990), recurrent brief depression (RBD) includes identical depressive symptomatology as MDD, but does not meet the two-week duration

requirement. Further investigation is called for in order to establish mild depressive episodes and recurrent brief depression as distinct clinical entities.

Romanoski et al. (1992) suggested that while the prevalence of psychiatrist-ascertained MDD does appear to decrease in late-life, the presence of other forms of depression (dysphoria, minor depression, subsyndormal depression) seem to increase with age. Most studies, according to a review by Tannock and Katona (1995), find that minor depression increases in a curvilinear fashion with age; an increase in the 30's, a decrease in the middle age, and a steady increase in old age.

It has been suggested that the presence of symptoms that do not fit into rigidly defined diagnostic criteria obscures the accurate diagnosis of depression in the elderly. For example, some elderly patients present symptom patterns of depression that are unusual or atypical: pseudodementia, pain syndromes, somatization, anxiety and alcohol abuse. These presentations, ignored in the DSM criteria, are usually termed "masked depression" (McCullough, 1991). Pseudodementia is a syndrome of cognitive decline that may accompany depressive illness and can mimic dementia. Distractibility, rapid onset and cognitive deficits, such as confusion and apathy, are characteristic of pseudodementia. In addition, some elders present depression in terms of pain syndromes, often in the context of a prevalent degenerative condition, such as arthritis. Pain syndromes may overshadow the underlying depressive symptoms, and narcotic analgesics or hypnotic medication may compound the depressive illness. Anxiety, also, in the elderly depressed may seem to be the primary symptom, when it is in fact secondary to depression, a so-called "anxious depression" (McCullough, 1991).

1.2 Distribution of MDD and depressive symptoms in elderly populations

1.2.1 Prevalence estimates

Herein are reported results from selected studies of community-dwelling elderly. Conventional wisdom dictates, and it seems intuitive, that depressive symptoms and disorders ought to be more frequent in older age, considering the accumulation of stressors across the life span. Consistent with this, most older epidemiological studies demonstrate a positive, linear association between depression and age in the 65 + group (Epstein, 1976). Skoog (1993) cites literature, which reports a disproportionately high rate of suicide in the community-dwelling elderly. In addition, there was a small but positive, significant relationship between age and Geriatric Depression Scale (GDS) scores in a sample of 408 subjects (Evans and Katona, 1993).

Other studies do not show the same inverse relation between age and depression. Most recent studies suggest that the prevalence of depressive symptoms is higher for younger age groups than for older cohorts. The symptoms of depression do not appear to increase with age, at least until age 75, in community populations (Blazer, 1990). Recent prevalence studies of major depressive disorders suggest that major depression is less prevalent among the elderly than younger birth cohorts (Cross National Colloborative Group, 1992). As well, using a logistic regression model, the association of age and depressive symptoms, in fact, was negative when potential confounding variables, such as sex, socio-economic status, physical disability, and social support, were controlled for (Blazer et al., 1991). The oldest

old, then, suffered from fewer depressive symptoms when the above covariates were considered. These data do not substantiate the widely held assumption of a negative correlation between the prevalence of major depressive disorder (and symptoms) and age.

The National Institute of Mental Health (NIMH) Epidemiologic Catchment Area (ECA) (Robins and Reiger, 1990) program measured the prevalence of psychiatric disorders, including major depression, across five sites in the United States. Combined results from all five sites reported a prevalence of MDD in community-dwelling participants aged 65 years and older that was less than 1% (0.4% for males, 1.4% for females, 0.9% for both sexes). This result is to be compared with the 2.7% prevalence rate for adults overall (Robins and Reiger, 1990). These data suggested that the true prevalence of MDD for community-dwelling elderly was lower than that for younger ages.

Data from the Edmonton study of mental disorders (Bland et al., 1988) found the lifetime prevalence of DSM-III major depressive episode to be 4.1% for those aged 65 or older, totaled over both sexes. This prevalence rate was lower than at any other age group; for those aged 45 to 54 the lifetime prevalence of a major depressive episode was 12.0%; for subjects aged 25 to 34 years the lifetime prevalence was 11.5%. These data suggest that the lifetime prevalence of major depressive episodes increases after the age of 24, but then declines after 55 years of age.

Various theories have been proposed to explain the seemingly protective influence that age exerts upon depressive disorders and symptoms. Elderly study participants may mask depressive symptoms. They may express depressive

symptoms in terms of somatic symptoms. Depressed elderly may also find it difficult to express or verbalize affective experience at all, a phenomenon termed alixethymia. In addition, the decreased lifetime prevalence of depression in older age maybe be due to a true cohort effect; there may be something about this older birth cohort that protects it against depression. As well, differential mortality may explain this finding; if older depressive cases experienced increased mortality, and not included in calculations of lifetime prevalence, it would explained decreased lifetime prevalence rates of depression in an elderly sample.

Using the Geriatric Mental State (GMS) examination, data from the Liverpool MRC-ALPHA study estimated the lifetime prevalence of depression, including both neurotic and psychotic subtypes at 10% for a sample of community dwellers aged 65 and older (Saunders et al., 1993). In addition, data from Edmonton, Alberta measured GMS-depression for an elderly community dwelling sample at 11.2% totaled over both sexes (Bland et al., 1988).

Weissman et al. (1991) called for the study of depressive symptomatology instead of rigidly defined disorders. The lifetime prevalence of depressive symptoms in the elderly is much higher than the prevalence of MDD, but is still considerably less than in younger age groups (Weissman et al., 1991). However, according to Blazer(1990), who cites evidence from Eaton and Kessler (1981), the prevalence of depressive symptoms among older adults is similar to the prevalence for other age groups. Even minor depressive symptoms may be predictive of more serious illness; Horwath et al. (1992) found that persons of all age groups with depressive symptoms,

compared to those without such symptoms, were 4.4 times more likely to develop first-onset major depression during a one-year period.

1.2.2 Incidence studies

Relative to the number of prevalence studies in psychiatry, incidence studies are uncommon due to the large sample sizes required. Eaton et al. (1989) employed data from each of the two waves of the ECA data to calculate incidence rates. He found that, for males of all age groups, the annual incidence of MDD was 1.10 (per 100 person-years of risk); for females, the estimated annual incidence was 1.98. For subjects aged 65 years and older, Eaton found that the annual incidence was 0.90 for males and 1.48 for females. Totaled over both sexes, the annual incidence for subjects aged 18 to 29 years was 1.72, compared to 1.25 for subjects aged 65 years and older. Using logistic regression modeling, the relationship of age to incidence of depression was statistically significant only for females.

1.3 Historical trends - disentangling age, period and cohort effects

The prevalence of MDD in the elderly population is not uniform across birth cohorts or historical time periods. There is consistent evidence for the changing rates of major depression, with higher rates in the more recent birth cohorts and an earlier age at onset (Wickramaratne et al., 1989; Cross National Colloborative Group, 1992; Klerman and Weissman, 1989; Lavori et al., 1987). As well, data has accumulated pointing out that the female: male ratio has declined in more recent birth cohorts (Koenig and Blazer, 1992).

A cohort effect refers to differences in rates of illness among individuals defined by year or decade of birth. Perceived social, economic and environmental problems may affect younger birth cohorts to a greater or lesser extent than older birth cohorts. A particular cohort may be more or less susceptible to disease than another generation, for whatever reasons. Older birth cohorts may be psychologically healthier. An age effect refers to a particular age when one is more or less vulnerable to an illness, usually measured by the age at first onset. For example, Henderson (1994) suggested and explored the possibility that age exerts a protective influence over depression. A period effect refers to changes in the rates of illness during a particular calendar period cutting across all age and cohort groups. Distinguishing between birth-cohort and period effects is statistically complex because of the 'identification problem' (Newman and Dyck, 1988); that is, unique estimates can not be known for linear age, period and cohort parameters (Lavori et al., 1987; Warshaw, 1991).

Until recently, explorations of the trends of depression were hampered by the absence of large-scale epidemiologic studies. The Cross National Collaborative Study (1992), employing data from nine epidemiologic studies and three family studies around the world, suggested that more recent birth cohorts exhibited an increased risk for major depression. Investigators at each site computed cumulative rates of depression using actuarial life table methods. Models containing linear and non-linear terms for age, period and cohort effects were fit. Cohorts born before 1915 were excluded from this analysis due to small sample size. There was a trend toward decreasing lifetime prevalence for older cohorts. However, this was not universal; for

Puerto Rico and Hispanic Los Angeles residents, no decrease in lifetime prevalence was found with increasing age. This suggests that lower rates found in the elderly in some locations may be real rather that due to problems with methodology, including instrumentation.

1.4 Etiologic factors - the identification of high risk populations

The determination of risk factors is important in order to predict the occurrence of a disorder, but also to suggest potential etiology and treatment (Koenig and Blazer, 1992). Major depressive disorders are more heterogeneous in symptoms and etiology, especially in late-life, than other affective disorders. Green et al. (1992) followed an elderly cohort three years after administration of the GMS and a social history questionnaire. Univariate analyses suggested the presence of three risk factors for development of depression at the third year: lack of satisfaction with life, feelings of loneliness and smoking. Multivariate analyses revealed that these three factors, as well as two further factors, female gender and bereavement of a close figure within six-months of the year-three diagnosis, were significant. Factors that are conventionally treated as risk factors (poor housing, marital status, living alone) were not significant (Green et al., 1992).

Female sex continues to be the clearest risk factor for major depression. The overall female: male ratio is 2:1, though most studies find higher ratios in younger age groups. In Klerman et al. (1985), female subjects of all ages were at a greater risk of depression. This preponderance in female subjects, however, was minimal in the more recent cohorts, probably due to the increased rate of major depression in male

subjects of more recent cohorts. By 80 years of age, however, rates for men may surpass rates for women (Koenig and Blazer, 1992).

The presence of a mood disorder in a first-degree relative is an important risk factor. For relatives of MDD patients, there is a 17% lifetime prevalence of MDD. For relatives of bipolar patients there is a 2% to 3% prevalence of MDD. However, there is some evidence to suggest that the genetic contribution of affective disorders is weaker in late life than at other stages of life (Baron et al., 1981). Weissman et al. (1984) found that the age-adjusted rate (per 100) of MDD in relatives of severely depressed probands was 16.5, compared to 5.1 per 100 relative of a normal control group. The adjusted odds ratio of developing severe MDD for relatives of depressed probands as compared to relatives of normal controls was 2.48.

Several predisposing factors for major depression have been identified by recent research, and they seem especially significant in the early course of the illness. Current social factors, such as the lack of a confiding relationship or a stressful, non-supportive social environment, may predispose an individual to an affective disorder. However, for an elderly case already diagnosed with depression, being married or having a large social network, may actually precipitate a poor outcome due to a hypothetical "smothering effect" (George et al., 1989). On the other hand, Evans and Katona (1993) also found a non-significant positive trend between living alone and depression in elderly primary care attenders. As well, Evans and Katona (1993) found that a lifelong lack of intimacy was positively correlated with elevated GDS score, but not with GMS casesness.

Certain personality traits and attitudes, such as obsessionality, learned helplessness, low self-esteem, or negative cognitive set, place an individual at higher risk for depressive disorders. Koenig and Blazer (1992) cite studies suggesting that recent stressful life events as well as Framingham Type A personalities are also strong correlates and predictors of geriatric depression. There is no relationship to social class or race to prevalence of major geriatric depression (Katona, 1994). In addition, religious behavior and church attendance may protect elders from geriatric depression (Koenig et al., 1988).

1.5 Prognosis - plotting the course and outcome of MDD

According to Millard (1983), most longitudinal studies indicate that one third or so of depressed elders recover completely, one-third recover partially and the other third remain ill for a long period of time. Factors that predict favorable prognosis for major depression in the elderly include female gender, current employment and social support (George et al., 1989). Characteristics associated with a better outcome include extroversion, absence of severe symptoms, familial history of depression, recovery from earlier episodes and the absence of other psychiatric illness (Post et al., 1972). Factors predictive of poor prognosis include the presence of delusions, cognitive impairment, and physical illness (Murphy et al., 1983).

Debate continues regarding how predictors of prognosis vary by age. Hughes et al. (1993) measured the effect of physical health and social support on a sample of 67 depressed patients, at most 60 years, and a sample of 46 depressed cases aged 60 years or older. For each age group, covariates, including demographics and

characteristics of the depressive episode, were examined as predictors of the Center for Epidemiologic Study – Depression (CES-D) score at six-month follow-up. Multiple regression analyses suggested that, for the younger age groups, physical illness and subjective support was predictive of depressive symptoms. This was not true for older depressives who had a better prognosis than younger patients.

In Finch et al. (1992), 119 subjects were initially admitted to an acute geriatric care center, 10% of whom had depressive illness and 30% of whom had minor but significant depressive symptomatology. At a one-year follow-up, 49% of the subjects were alive, 48% were dead and 3% could not be found. Thirteen percent had a depressive illness and 25% expressed significant depressive symptoms. No relation was found between depressive diagnosis or symptoms and mortality.

1.6 Factors that influence the estimates of prevalence of depressive disorders

Various methodological issues may complicate the diagnosis of geriatric depression; Rapp et al. (1988) found that only 8.7% of elderly, depressed patients were so diagnosed by hospital staff. Discrepancies in the estimates of MDD prevalence between studies may be due to various methodological problems, artifacts or spurious causes. Newmann (1989), attempting to uncover the relationship between older age and depression, reviewed 21 community surveys. Her main conclusion was that diverse measurement techniques make it difficult to draw conclusions from this large body of research. Discussed below are several specific methodological issues to be kept in mind when considering this body of research.

1.6.1 Response bias and recall bias

As mentioned earlier, the elderly depressed may be misdiagnosed due to a reluctance to acknowledge affective symptoms or the inability to verbalize affective experience (alexithymia), a form of response bias. Lyness et al. (1995) found that self-reported depressive symptoms and age were negatively correlated, probably signifying an underreporting of depressive symptoms. Somatization, the tendency to express symptoms in terms of somatic complaints (Katon et al., 1982), is demonstrated by elderly subjects who may complain of sleep disturbance, problems with "nerves" or other somatic symptoms of depression, rather than affective disturbance. The two most common presentations are fatigue and gastrointestinal problems (McCullough, 1991). The complaints are often vague and difficult to attribute to organic etiology; such "masked" depression is reportedly common in the elderly population and complicates the diagnosis of depression in this age group. Misdiagnosis may also result from recall bias, due to poor memory in the elderly, leading to an artificial age difference in the rates of depressive illness. For all these reasons, the elderly may not be a reliable source of information on the psychiatric events earlier in their life.

1.6.2 Concurrent medical illness

The diagnosis of MDD in the elderly is complicated by difficulties distinguishing cognitive and somatic symptoms of depression from the normal aging process and comorbid physical illness. Symptoms that are typically shared by

depression and physical illness include loss of energy, slowing of movements, sleep disturbance, and loss of weight and appetite. Serious medical illness may imitate or complicate the diagnosis of depression (Blazer, 1994). Concurrent medical illness is also considered an etiologic factor and a predictor of poor prognosis (Murphy, 1983). Katona (1992) found a significant positive relationship between depression in older age and physical illness.

It is necessary, also, to consider the role of physical illness when interpreting somatic and affective symptoms of depression. For instance, vitamin B_{12} deficiency, Parkinson's disease, multiple sclerosis and strokes may present in a variety of psychiatric symptoms (McCullough, 1991; Fonda, 1985).

Especially important in the elderly population is the interface between depression and dementia. Symptoms of depression and dementia may overlap to some extent, potentially due to a close biological relationship. Ballard et al. (1996) examined the prevalence of major and minor depressive disorders for patients suffering mild to moderate dementia. The lifetime prevalence rate of major depression in all forms of dementia was 25.0% much higher than in the general elderly population. Results also suggested a higher prevalence of major depression, and more severe depressive symptomatology for those suffering from vascular dementia than in those with Alzheimer's disease. Migliorelli et al. (1995) showed that 28% of Alzheimer patients had dysthymia and 23% had major depression. Burns et al. (1990) reported at least one symptom of depression in 63% of an Alzheimer sample, while trained observers rated 23.5% of the same sample as depressed. Antidepressant medication, however, was taken by only 5.6% of the sample. Unique

rating scales such as the Cornell Scale for Depression in Dementia (Alexopoulos et al., 1988) have been developed for the diagnosis of depression in the cognitively impaired population.

1.6.3 Comorbid psychiatric illness

For subjects of all ages with major depression, there is an increased risk for substance abuse/dependence, panic disorder, and obsessive-compulsive disorder. For an Edmonton sample of household residents (Spaner et al., 1994), the odds ratio of mania and lifetime MDD was 20.8 for all age groups. The odds ratio of dysthymia and lifetime MDD were 24.4. The odds ratio of ever having a panic disorder and MDD were 29.5. As well, those with a lifetime history of MDD were 4.8 times more likely to have a lifetime diagnosis of obsessive compulsive disorder. These large odds ratios illustrate the potential of missing a diagnosis of depression due to the presence of other psychiatric disorders.

Alcoholism in the elderly, frequently under-recognized in clinical practice (Gupta, 1993), is prevalent, especially in the institutionalized elderly population. Wattis (1981), presenting seven case reports of elderly patients admitted to a psychiatric service, explored the importance of recognizing repeated falls, confusion and self-neglect in the clinical setting. Callahan et al. (1994) urged that high comorbidity rates for alcoholism and depressive disorders in the elderly should be considered by clinicians during diagnosis and treatment.

1.7 The fourth edition of the Diagnostic and Statistical Manual (DSM)

The current classification scheme of the American Psychiatric Association (APA) is the DSM-IV. It codifies a major depressive episode as the presence of either depressed mood (dysphoria) or loss of interest (anhedonia), plus associated symptoms for a total of 5 or more symptoms. MDD can not be diagnosed in the presence of manic episodes or when organic factors or reactions to loss may not better explain the symptoms, and have a duration of not less than 2 weeks.

The Diagnostic Interview Schedule (DIS), a semi-structured interview schedule, makes DSM diagnoses and was developed for the ECA study. The DIS has been criticized for its reported inability to distinguish between somatic symptoms of depression that result from physical illness and those that result from actual psychiatric causes (Snowdon, 1990). This may have lead to an underestimate of depression in old age in the ECA study (Slater and Katz, 1995). The DIS allows the examinee to attribute the presence of depressive symptoms to psychiatric illness, to drug or alcohol use, or to physical illness or injury. Heithoff (1995) explored this issue, by recoding somatic symptoms of depression originally attributed to physical causes to psychiatric causes. However, this recoding did not significantly increase ECA estimates of lifetime prevalence of depression. Slater and Katz (1995) called for research into the question that the DIS may, in other ways, underestimate depression; they suggested that elderly subjects may rate important symptoms as minor or subthreshold.

1.8 The Geriatric Mental State (GMS) examination

The Geriatric Mental State (GMS), a psychiatric questionnaire designed for use in the elderly population, was developed by Professor John Copeland in Liverpool in 1976 (Copeland et al., 1976; Gurland et al., 1976). This comprehensive assessment schedule was derived from two other tools, the Present State Examination (PSE) and the Psychiatric Status Schedule (PSS) (Spitzer et al., 1970). It is a standardized, semi-structured interview, which for the full version takes about 30 to 45 minutes to deliver. For most recent editions of the GMS, a non-clinician interviewer administers the exam. It is widely used in Europe, but is virtually unheard of in North America. The Automated Geriatric Examination for Computer Assisted Taxonomy (AGECAT), its associated standardized computer diagnostic program, was developed to ensure diagnostic reliability (Dewey and Copeland, 1986). AGECAT is a computer program containing various diagnostic algorithms necessary to make a range of GMS diagnoses. Unfortunately the diagnostic criteria and algorithms for AGECAT have not been published. The criteria for AGECAT depression, therefore, remain elusive.

AGECAT processes GMS item responses in two stages in order to arrive at a final diagnosis. It condenses GMS item scores into 157 "symptom components" and further into eight "syndrome groups": organic, manic, hypochondriac, obsessive neurotic, schizophrenic, phobic, anxiety and depressive disorders. The depressive syndrome cluster is divided into depressive psychosis and depressive neurosis.

At stage I, AGECAT assigns levels of confidence, indicating severity, (between 0 and 5) to each of the eight syndrome clusters. There is a provision for

flagging unusual responses, usually meaning that a serious symptom was rated in the absence of the less severe symptom. Levels of confidence of three and above correspond to clinical caseness and are considered 'AGECAT syndrome cases'. Levels of one or two are designated 'AGECAT syndrome sub-cases' (Copeland, 1988). At stage II, AGECAT takes these syndrome clusters and compares them in a hierarchical scheme. For example a stage II diagnosis of depression can not be made in the presence of a diagnosis of organic, schizophrenic or manic disorders (Dewey and Copeland, 1986). If the subject's stage II diagnosis has a confidence level of three or more, the subject is termed an 'AGECAT diagnostic case'. If the stage II diagnosis has a confidence level of one or two, the subject is considered an 'AGECAT diagnostic sub-case'.

Copeland et al. (1976) stated that the GMS, which does not rely heavily on somatic symptoms of depression, was created in response to the difficulty distinguishing between somatic symptoms of depression and the normal aging processes. There is included in the GMS a separate "Somatic Dysfunction" scale, to minimize this complication.

AGECAT has been validated against psychiatrists' diagnoses. Copeland et al. (1988) replicated earlier studies (Copeland et al., 1986) of concordance between computer diagnosis and psychiatrist's diagnosis. Subjects from three studies in Liverpool, Nantwich and Hobart, Australia were administered the GMS. Psychiatrists or geriatricians made a diagnosis at the end of the GMS interview according to DSM-III criteria. For the diagnosis of depression, psychiatrist's diagnoses agreed with AGECAT diagnosis on 65 of the 82 cases of AGECAT

depression (79%). There was a set of subjects on whom both systems agreed, but a smaller set that presented diagnostic difficulty. This observed rate of concordance (Cohen's kappa 0.73) is at least as good as usually found between psychiatrist's themselves (Copeland et al., 1988).

1.9 Discrepancy between DSM-III and GMS-AGECAT depression

Throughout the literature, disparate prevalence estimates of depression in the elderly abound, obscuring an understanding of the relationship between depression and older age. As discussed earlier, studies that employ DSM-III criteria usually estimate lifetime prevalence of depression between 2% and 4% in the community-dwelling aged (Blazer, 1994). In the elderly population, estimates of lifetime prevalence of MDD are about 1% to 3%. Using data from the Epidemiologic Catchment Area (ECA) project, Weissman et al. (1985) estimated the prevalence of depression at 1.7%, using the DIS and criteria from DSM-III. Data from the Edmonton study (Bland et al., 1988) estimated the lifetime prevalence of DSM-III major depression for those aged 65 and older at 4.1% for both sexes combined.

On the other hand, when the community version of the Geriatric Mental State (GMS) examination is used, the estimate of lifetime prevalence in the community dwelling elderly is about 10%. For instance, Copeland et al. (1987) measured depression in an elderly community sample using the GMS and found the prevalence of depression to be 11.3%, much higher than estimates using other diagnostic tools, such as the DIS-DSM-III system. Using GMS data from the cross-sectional stage of

a longitudinal study, Saunders et al. (1993) calculated overall, age-standardized prevalence rate of depressive illness at 10% in an elderly community sample.

These inconsistencies raise questions about the diagnostic criteria for geriatric depressive disorders and raise questions about the nature of a case of GMS-AGECAT depression. The aim of the present study was to explore the relationship between GMS/AGECAT depression and DSM major depression. We were particularly interested in the role of somatic symptoms in GMS/AGECAT. Earlier work by Newman and Bland (unpublished) showed that somatic symptoms of depression were much more prevalent than cognitive or dysphoric symptoms in cases of GMS/AGECAT depression. The work that follows investigates the clinical picture of GMS-AGECAT depression, since explicit diagnostic criteria have not been published. As well, important symptoms that comprise "GMS-AGECAT depression" are delineated in the present study.

Chapter 2

Materials and Methods

Diagnostic criteria for GMS-AGECAT depression are unpublished, yet it would be helpful when interpreting studies using GMS-AGECAT to have an understanding of the diagnostic procedures. The following analyses endeavor to identify symptoms important to GMS-AGECAT depression, and further explain relatively high prevalence rates of geriatric depression in community studies employing the Geriatric Mental State (GMS) examination. In the following analyses, a revised version of AGECAT, called GAGE, was used to generate computer diagnoses. To determine their importance, depressive symptoms were recoded to absent. GMS-GAGE diagnostics were rerun and prevalence rates were recomputed. A multiple logistic regression model was built for the dichotomous dependent variable, GMS-GAGE diagnosis of depression, to further examine the organization of depressive symptoms in GMS-GAGE cases of MDD.

2.1 The Sample

Data for the present study were collected in conjunction with a national collaborative project, the Canadian Study of Health and Aging (CSHA). CSHA methods have been reported elsewhere in detail (CSHA Working Group, 1994). Briefly, 18 centers across Canada, including Edmonton, participated in the development and implementation of the CSHA project. The main aim of the study

was the measurement of the prevalence of specific types of dementia in Canada's elderly population.

At the Edmonton CSHA site, 449 community-dwelling participants age 65 and older were sampled from Alberta Health insurance lists, an essentially complete record of the province's population. Community subjects were selected using an age-stratified random sampling technique. Eligibility criteria for the community sample included living at home during the recruitment phase, the ability to speak French or English, not being too ill to be interviewed, as well as the ability to provide informed consent, directly or by proxy. In addition to various assessments regarding the presence of dementia, the 449 CSHA participants at the Edmonton site were administered the GMS.

An additional 671 subjects were drawn from Edmonton's community-dwelling elderly. These 671 subjects were selected using exactly the same procedure as the 449 CSHA participants and interviewed with the GMS. It was therefore appropriate to combine these two groups into a total sample of 1,120.

2.2 The Geriatric Mental State (GMS) examination

The Geriatric Mental State (GMS) examination was administered to all 1,120 study participants by trained non-clinician interviewers. As discussed in a previous section, the GMS is a semi-structured questionnaire appropriate for use in an elderly population. A complete interview typically requires about 30 to 45 minutes to deliver.

In its original version, the GMS was designed for use with hospitalized populations (Copeland et al., 1975). In its more recent editions, the GMS is suitable for use with community samples (Copeland et al., 1987). Version A3 of the GMS examination, administered to the present sample, is virtually identical to its predecessor (version A2), except for the inclusion of questions regarding the two-week presence of a range of DSM-III symptoms.

For the analyses that follow, syndrome cases of depression, that is, stage I depression with a level of confidence of 3 or more were used to determine caseness. Stage II diagnoses (with its embedded hierarchy) were not used, in order to eliminate difficulties with the exclusionary diagnoses of organic disorders, schizophrenia and mania. See Section 1.8 for further discussion of the Geriatric Mental State (GMS) examination, and the Automated Geriatric Examination for Computer Assisted Taxonomy (AGECAT).

2.3 Handling of the data set

The paper version of the Geriatric Mental Status (GMS) examination, version A3, was administered to all 1,120 study participants. The data were entered into a database, where data underwent edit checks. At this stage, GMS data on each subject was contained in a separate file; there were, then, 1,120 individual GMS files. Files did not include the subject's name or other personal identification.

In order to delineate depressive symptoms most important to GMS-GAGE depression, groups of symptoms were recoded from present to absent across all study subjects. Next, data were re-analyzed and the frequency of GMS-GAGE depression

recalculated. This way, the effect of nullifying groups of symptoms upon the prevalence of GMS-GAGE depression was measured. This required the ability to combine individual GMS files into a single master file as well as the ability to analyze this large data file using a diagnostic program.

Various software, kindly provided by the Liverpool group, provided us with means to conduct these analyses. A program called GMSPACK gathered together these many GMS files into one master file. The EGMS software produced an intermediary file for the comprehensive data file. Finally, GAGE, the updated version of AGECAT, developed by Dr. Michael Dewey of the Liverpool Group was used to produce stage I and stage II diagnostic output. SPSS (version 6.1.2) was used for database management and statistical analysis.

2.3.1 Comparing GAGE and AGECAT diagnoses of depression

According to Copeland and Dewey (1996), GAGE corrects a number of errors in the depression cluster as well as in the organic and anxiety clusters of earlier AGECAT software. As well, there were some minors changes to the details of the stage I and stage II output of AGECAT. In this thesis, all diagnoses were made using GAGE software, except for a section in the next chapter where AGECAT and GAGE are compared.

2.4 Devising symptom clusters

Items on depression were extracted from the GMS and arranged into symptom groups in order to facilitate the analyses that follow. All items relating to DSM-IV

major depression were extracted from the GMS plus other items which seemed relevant in tlfe writer's opinion. The fourth edition of the Diagnostic and Statistical Manual (DSM-IV) was employed as a framework for selecting and subsequently arranging these GMS items into symptoms groups in a meaningful way. The symptom groups, with the number of constituent GMS items in square brackets, are as follows:

group 1 - depressed mood [13]
group 2 - marked loss of interest or pleasure in most activities (anhedonia)[4]
group 3 - significant weight or appetite disturbance[8]
group 4 - sleep disturbance, including insomnia or hypersomnia [7]
group 5 - psychomotor retardation or agitation[4]
group 6 - fatigue or loss of energy[5]
group 7 - feelings of worthlessness or excessive, inappropriate guilt[3]
group 8 - difficulty thinking or concentration, including indecisiveness[5]
group 9 - suicidal ideation, suicide attempt or recurrent thoughts of death[4]

The groups are numbered one through nine, in accordance with DSM-IV criteria. Thirteen of the 56 GMS items on depression related to the first group, dysphoria. Accordingly, group 1 (dysphoria) was further subdivided into five subgroups as follows:

group 1a - feeling sad [1]
group 1b - reports of crying [2]
group 1c - observational reports of sadness [3]
group 1d - feelings of hopelessness [2]
group 1e - permanence or relief of depression [5]

Group 1e (permanence or relief of depression) is considerably more difficult to characterize than other group 1 subgroups. It refers to the endurance of depressive

symptoms and the factors that alleviate those symptoms. See Appendix I for a list of the GMS items collected into each of the above groups and subgroups.

Each of these symptom groups and sub-groups were further classified as dysphoric, cognitive or somatic. Group 1 and its subgroups were considered "dysphoric" symptoms of depression. Group 3 (weight/appetite disturbance), group 4 (sleep disturbance), group 5 (psychomotor agitation/retardation) and group 6 (loss of energy) were considered "somatic" symptoms of depression. Somatic groups were defined as those depressive symptoms that related to the physical, corporeal manifestations of depression. For example, group 5 (psychomotor agitation / retardation) was considered somatic, since it attempted to define not only the feeling of being slowed, but as well as actual, quantifiable slowness. On the other hand, group 2 (loss of interest), group 7 (concentration problems), group 8 (feelings of guilt/worthlessness), and group 9 (suicidal ideation or thoughts of death) were considered "cognitive" symptoms of depression. Cognitive symptoms of depression, like group 7 (concentration problems), are perhaps less immediately tangible, relating to more personal, subjective experience.

2.5 Removing the effect of symptom groups

The GMS questions that corresponded with each of the above symptom groups were recoded from present to absent. This was done for symptom groups, subgroups and individual items from the GMS questionnaire, depending on the objective of particular analyses.

When the effects of these symptom groups, subgroups or individual items were nullified, the GMS-GAGE diagnostic system was rerun. These diagnoses where then inputted into a SPSS data file, and frequency tables were created to produce counts of depressive cases. Through this procedure, we were able to determine the effect of nullifying individual or combinations of symptom groups on the overall prevalence for stage I GMS-GAGE depression.

2.6 Standardization according to age and sex structure of the population

Due to the complex sampling strategy, it was necessary to create survey weights. The population of community-dwelling elderly in Alberta was estimated by subtracting the population of institutionalized elderly from the 1991 Alberta Census population. The ratio of the community dwelling elderly and the total Alberta population was multiplied by the total Edmonton population. This yielded an estimate of the community dwelling elderly in Edmonton. These analyses were based on five age groups (65-69, 70-74, 75-79, 80-84, 85+) as well as gender. Survey weights were derived to post-stratify to the 1991 non-institutional population of Edmonton. All prevalence rates reported in the following chapter are weighted rates.

2.7 Building a logistic regression model

To further examine the importance of various symptoms on the diagnoses of GAGE depression, a multiple logistic model was built for the dichotomous variable, GAGE depression. The general form of multiple logistic regression is as follows:

$$\ln (P/[1-P]) = B_o + B_1X_1 + B_2X_2 + \ldots B_jX_j + e.$$

P is the probability of a dichotomous outcome, in this case GAGE depression. P/ (1-P) is the odds of the outcome and B_j is the coefficient of the j^{th} independent variable. The term, e, represents the independent random error. The natural logarithm of the B_j coefficient is the odds ratios corresponding to the jth independent variable. An unweighted logistic regression was employed in the present study, since we were looking for correlations between GMS-GAGE depression and symptoms of depression within the data set, and not population estimates of the prevalence of depressive symptoms and GMS-GAGE depression. Independent variable names used in the model building process are presented here in capital letters. Independent variables included AGE, SEX, the DSM symptoms GROUPS 1 through 9, as well as the five subgroups of GROUP 1 (dysphoria). The variables for the DSM symptom groups were dichotomous; the depressive symptoms were either present or not present.

The proper scale for the AGE variable was determined prior to incorporating it into the multiple regression model. The quartiles of its distribution were examined, and design variables constructed. The Box-Tidwell approach (Box and Tidwell, 1962) which adds the variable AGE*ln(AGE) to the model including AGE, was employed; a nonsignificant coefficient indicated linearity and so AGE was thereafter treated as a continuous variable.

First, a univariate analysis was conducted with each variable as a single main effect. This preliminary statistical assessment determined which variables would be

included in the model building for multivariate analyses. A liberal inclusion criterion, based on the likelihood ratio (LR) test, was used. For these univariate regressions, a conservative LR criterion of $p<0.25$ was used to ensure that all important variables were included.

Models were then built with selected variables using a forward stepwise regression technique. The forward stepwise technique employed by SPSS was used initially. Using this method, SPSS automatically adds or deletes variables in the block, based on the LR statistic. This approach was subsequently abandoned so that the inclusion of clinically important but statistically nonsignificant variables could be monitored.

Using a manual method, independent variables were entered or removed from the model on the basis of the significance of the LR test. Specific combinations of clinically important as well as statistically important variables were examined. The multiple regression coefficients for variables were compared to the coefficients from the univariate analyses: a marked change might indicate the exclusion of an important variable

Goodness of fit statistics were not considered as this logistic regression modeling was employed, not as a predictive tool, but as a descriptive one. Logistic modelling was undertaken only to pinpoint important symptoms in the GAGE cases, and not to create a multivariate model of community prevalence rates.

Chapter 3

Results

An understanding of the clinical picture for GMS-GAGE depression could lend a further, more accurate delineation of the symptoms that comprise "depressive disorders" in the elderly population. The present study sought, among other aims, to clarify the processing of somatic symptoms of depression in GAGE, an updated version of the computerized diagnostic tool, AGECAT. Findings presented here show that, in fact, dysphoric symptoms are more important than somatic symptoms to the diagnosis of GMS-GAGE depression. For the whole of this chapter, all GMS-GAGE diagnoses are stage I diagnoses, unless otherwise indicated.

3.1 The Sample

As discussed in the previous chapter, 449 subjects were selected from the CSHA Edmonton site. The CSHA sample was extended by interviewing an additional 671 community subjects, who were selected using the same procedures as for the CSHA sample. In order to recruit the 1,120 participants for the present study, a sample of 2,413 was drawn from the Alberta Health insurance database. In all, 1,027 subjects (42.6%) of the initial sample did not fit inclusion criteria for reasons such as deceased, away during the study period, too ill to be interviewed, language difficulty or deafness. Of those drawn from the database, 240 (17.8%) refused to participate. Of the 1,360 subjects who fit eligibility criteria, 1,120 interviews were completed, giving a response rate of 82.4%; the two component samples, the CSHA

data and the extension data, had virtually identical response rates (CSHA 82.5%, extension 82.2%). One subject was entered into the database twice, with only partial information in one listing, so there were consequently 1,119 subjects in the study sample.

3.2 Socio-demographic characteristics of the sample

Table 3.1 presents the age and sex structure of the sample. The study sample consisted of 40% males and 60% females. The age structure was such that 41% of the sample was between the ages 65 and 74, 42% fell between the ages of 75 and 84, and 17% of the sample was 85 years or older. These rates are not weighted to the age and sex structure of Edmonton, Alberta's elderly, community-dwelling population.

The weighted prevalence rates of GMS-GAGE diagnoses, including depression, are shown in Table 3.2. Refer to Newman et al. (submitted) for further details. For both male and female elderly subjects, the most prevalent GMS-GAGE diagnosis, besides depression, was organic disorder (weighted prevalence totaled over both sexes: 2.9%). The high prevalence of GMS-GAGE organic disorders, and concurrent cognitive impairment, may complicate the diagnosis of depression. Sections from the first chapter discuss how dementia may obscure the accurate diagnosis of depression in the elderly; various patterns of cognitive decline may conceal underlying affective illness. Cognitive dysfunction may then spuriously decrease the depression rate.

3.3 Comparison of GAGE and AGECAT diagnoses

From earlier work of Newman et al. (submitted), a data set consisting of AGECAT diagnoses for the present sample along with subject identification numbers was available to be merged with the data set of GAGE diagnoses. Stage I GAGE diagnoses were cross tabulated with stage I AGECAT diagnoses in order to explore the differences in these two diagnostic algorithms (Table 3.3). Only 8 of the 143 cases of GMS-GAGE depression were not also GMS-AGECAT cases and only 3 of the 138 cases of GMS-AGECAT depression were not also GMS-GAGE depressive cases. There were few cases, mostly isolated to the sub-cases of depression that had different AGECAT diagnoses than GAGE diagnoses. As well, there were fewer instances of unusual flags in all GMS-GAGE diagnoses, not just depression, than in the GMS-AGECAT diagnoses. An unusual flag indicates that a serious symptom was rated without the expected less severe rating. These findings are consistent with Copeland and Dewey (1996, unpublished). Because there are only slight differences between GAGE and AGECAT, the findings of the present study, which used GAGE diagnoses, will apply equally to AGECAT diagnoses.

3.4 Prevalence of GAGE (stage I) depression

There were 143 cases of GAGE (stage I) depression in the sample; the weighted prevalence rate of GAGE depression was 11.3%. This estimate is only slightly higher than the prevalences from the literature cited in Chapter 1. Table 3.4a further gives the distribution of GMS-GAGE depressive cases by gender and age groups. There was evidence of a slight increase in prevalence rates with advancing

age. Overall, the female: male ratio was 1.96; this ratio increased with successive, older age groups for GAGE (stage I) depression. Table 3.4b is discussed later in the chapter.

3.5 Prevalence of depressive symptoms in the study sample

Table 3.5 gives the overall weighted prevalence of DSM-IV depressive symptoms according to symptom groups for all study participants. Somatic symptoms (50.7%) as well as dysphoric symptoms (32.6%) of depression were very prevalent. For instance, 25.7% of participants exhibited sleep disturbance, 35.7% of the sample complained of psychomotor retardation /agitation, and 20.9% of subjects exhibited symptoms relating to loss of energy symptoms. The weighted prevalence of dysphoria was 32.6%. Feeling sad (subgroup 1a) and crying (subgroup 1b) were particularly prevalent among the subgroups of group 1.

The prevalence of depressive symptoms in those with and without GAGE depression was examined (Table 3.6 and Table 3.7). The columns labeled DSM-IV type depression are discussed further below. It is noteworthy that dysphoric symptoms were present in nearly all GMS-GAGE depression cases (99.2%). Somatic symptoms of depression (85.0%) were much more frequent than cognitive symptoms of depression (50.4%) in GMS-GAGE cases of depression. This lead to the hypothesis that the high prevalence rate of GMS-GAGE depression might be explained by the manner in which GMS-GAGE processes somatic symptoms of depression.

3.6 Nullifying the effect of symptom groups

Table 3.8 shows the effect of removing symptoms groups and subgroups upon the diagnosis of GMS-GAGE depression. When no symptom groups were recoded to absent, the original 143 GAGE cases of depression were, of course, not affected. The effect of removing the dysphoria (group 1) symptoms was large; the number of GAGE depressive cases was reduced to only 24. Except for permanence/relief of symptoms (subgroup 1e), removing dysphoria (group 1) symptom subgroups did not greatly affect the number of cases of depression. The subgroup "permanence and relief of depression" includes GMS items that refer to how long symptoms last, how persistent symptoms are and relief of depressive symptoms. Nullifying the subgroups "feeling sad" (group1a), "crying" (subgroup 1b), "reports of sadness" (subgroup 1c) and "hopelessness" (subgroup 1d) reduced the number of GAGE depressive cases to 137, 122, 134 and 142 respectively. After removing permanence and relief of dysphoria (subgroup 1e), only 81 cases of GAGE depression were left. Removing each of the remaining cognitive or somatic symptoms individually reduced the number of cases by at most three cases. For example, removing sleep disturbance (group 4) from the diagnostic algorithm only reduced the number of stage I cases to 140. As well, removing feelings of guilt or worthlessness (group 7) reduced the number of cases to 142.

Refering to Table 3.8, the sum of the cases lost after nullifying individual symptom subgroups 1a, 1b, 1c, 1d and 1e is 99 cases of GMS depression, contrasted with the 119 cases lost when all 5 subgroups were nullified simultaneously. The reason for this apparent paradox is not clear because the AGECAT algorithms have

not been published. However, a possible explanation is that these 20 cases of depression may have had multiple dysphoric symptoms, no one of which was necessary to the diagnosis of depression, but failed to reach case status when all dysphoric symptoms were nullified.

Table 3.9 shows the effect of nullifying several symptoms at the same time. After nullifying the effect of all cognitive symptoms of depression, there were still 142 cases of GAGE depression left. After nullifying the effect of the somatic symptoms of depression, there were still 128 cases of depression. As remarked above, after removing dysphoric symptoms there were 24 cases of depression. From these analyses, it appears that as opposed to dysphoric symptoms, somatic and cognitive symptoms of depression are not as important in the diagnosis of GMS-GAGE depression. When all symptom groups were recoded from present to absent there were still 6 cases of depression. This shows that there are GMS items outside the 56 selected for analysis that are used in the GAGE algorithm for depression, and that for 6 subjects, these were sufficient to reach case level.

When both cognitive and somatic symptoms were nullified, leaving dysphoric symptoms (plus remaining GMS items not included in the total 56), there were still 137 cases of GMS-GAGE depression. This suggests that dysphoric symptoms (plus the other unknown symptoms used by the algorithm) are sufficient for the diagnosis of GMS-GAGE depression. On the other hand, when all symptom groups were nullified, except for those to do with cognitive symptoms, there were only 9 cases of GMS-GAGE depression. Cognitive symptoms (and the undefined GMS items not included in the 56 GMS items used in these analyses) are clearly not sufficient for the

depression diagnosis. When only somatic symptoms were included in the analyses, there were only 20 cases. Like cognitive symptoms, somatic symptoms (and the other items not included in the 56 GMS items) were far from sufficient for the diagnosis of depression. Of the 56 items, only those dysphoric symptoms groups seem to be required to achieve the diagnosis of depression.

Removing the effect of the dysphoric symptoms caused the greatest drop in the number of GAGE depressive cases, and thus leads to the inference that the GMS-GAGE system gives the greatest weight to dysphoric symptoms and the least weight to the cognitive and somatic symptoms of depression. This is surprising in light of the observation that GMS-GAGE cases of depression have especially high rates of somatic complaints.

We also conducted analyses using stage II GAGE depression with its imbedded hierarchy. The number of stage II depressive cases was 123. A curious result was that upon nullifying items concerning the concentration/thinking symptoms the number of stage II depression cases actually increased to 127. This paradoxical finding can be explained as follows: a subject may reach case level in stage I for organic as well as depressive syndrome clusters. Because organic is higher in the GAGE hierarchy, these cases would be diagnosed as organic and not depressive cases at stage II. By nullifying cognitive symptoms, we should expect to lose stage II cases of organic, with more cases ending up with a stage II depressive diagnosis.

3.7 Logistic regression model

The logistic regression model, using GAGE diagnosis of depression as the dependent variable, was developed through a series of analyses. This was done in order to identify the most important depressive symptoms (the independent variables) to the diagnosis of GAGE depression. Exploratory univariate analyses were first conducted for each of the covariates separately, that is, all of the DSM symptom groups and subgroups. For this initial analysis, all variables (groups 1-9, subgroups 1a-1e) reached significance level of $p<0.25$, our predetermined cutoff to be included in the model building process.

The inclusion and scaling of the AGE and SEX variables were considered. The Box-Tidwell approach (Box and Tidwell, 1962), adding AGE*ln(AGE) to the logistic regression model already including AGE, yielded a non-significant p-value. This finding suggests that the AGE variable is linear, which is consistent with the age-specific findings in Table 3.4a. While the continuous variable AGE did not reach an appropriate significance level ($p=0.49$), it was included in the logistic regression model for its clinical significance. The variable, SEX, as well was included for the same reason, although it did not reach statistical significance ($p=0.28$).

Using a manual forward regression, variables were included in the model-building process based on estimations of clinical significance as well as the significance of the G-statistic. Dysphoric items reached the greatest significance. Various combinations of all independent variables were tried, and in every combination dysphoric symptoms were always important no matter what else was in the model. In fact, as shown in Table 3.10, only the variables for the five subgroups

of dysphoria (group 1), as well as fatigue or loss of energy (group 6) and thoughts of death (group 9) were included in the final model. This logistic regression model supported the findings in the previous section that dysphoric symptoms of depression were important. Refer to Table 3.10 for further details of the model built. In Table 3.10, the slope coefficient for the AGE variable (treated as continuous) suggested a small negative association between increasing age and GMS-GAGE depression. The coefficient for the SEX variable, as well, suggested a positive association between female sex and GMS-GAGE depression. The odds ratios for all of the DSM-IV symptom groups were positive. Especially high is the odds ratio for GROUP 1E (permanence /relief of depression), unsurprising since GMS items in this category assume the existence of depressive symptoms (see Appendix I).

Crude odds ratios were obtained from the initial univariate analyses for all covariates. These were compared to odds ratios derived from slope coefficients from the regression model that included all covariates entered at once. There were no obvious discrepancies, suggesting that there were no variable obviously omitted. Table 3.11 which compared the odds ratios computed from univariate analyses to the odds ratios obtained from logistic regression model which included all covariates.

As outlined in the last chapter, no significant interaction terms were examined and no goodness of fit statistics were computed. This was because the modeling technique was not to be used as a predictive model, but only to describe the most important aspects of the GAGE depressive cases.

3.8 Devising a DSM-IV type diagnosis

Earlier work by Newman and Bland (unpublished) showed that true DSM-III cases of major depression were a very small subset of AGECAT cases. Using the same sample of 1119, there were 5 cases of rigidly defined DSM-III depression, only one of which was also an AGECAT case of depression.

In this study, however, we broadened the definition of DSM caseness, calling it "DSM-IV type depression". An adapted DSM computer algorithm was built within the SPSS syntax editor, using criteria A and B only. The 56 GMS items already mentioned were grouped into DSM-IV categories for major depression; see Table 2.1 for the breakdown. A positive response to only one GMS item in a group constituted the existence of that DSM-IV symptom group. A hypothetical study participant, who responded positively to a GMS item from five of the nine symptom groups, including dysphoria (group 1) or loss of interest (group 2) was termed a "DSM-IV type depressive case". As well, there were no exclusionary diagnoses; that is, the final diagnosis was non-hierarchical. The subject needed only to rate the symptom as present, whether mild or severe, to be coded as "symptom present". This was done in order to keep the DSM-IV type diagnoses as inclusive as possible.

There were 74 cases of DSM-IV type depression with an overall weighted prevalence of 6.61 %. As shown in Table 3.4b, the female: male ratio for DSM-IV type depression decreased with age, unlike GAGE depression. Table 3.6 and Table 3.7 present further details regarding the prevalence of symptoms of depression in DSM-IV type cases. Notice that besides dysphoric symptoms (present in all cases of

DSM-IV type depression) somatic symptoms of depression were especially high (100%,) compared to 84.7% for cognitive symptoms of depression.

As shown in Table 3.8, nullifying the effect for any symptom group caused approximately the same drop in number of DSM-IV type cases. That is, removing dysphoric and cognitive symptoms of depression, dysphoria (group 1), loss of interest (group 2) feelings of guilt/worthlessness (group 7), difficulty concentrating (group 8) and thoughts of death (group 9) reduced the number of DSM-IV type cases from 74 to, respectively, 29, 42, 43, 36 and 45. Removing the effect of somatic symptoms of depression, weight/appetite disturbance (group 3), sleep disturbance (group 4), psychomotor agitation/retardation (group 5) and loss of energy (group 6), reduced the number of cases to 39, 33, 30 and 31. There seemed to an equal distribution of the importance of each symptom to DSM-IV type depression.

We had hypothesized that GMS diagnoses milder cases of depression. According to cross-tabulations of DSM-IV type depression and GAGE stage I depression (see Table 3.12), of the 74 DSM-IV type, 44 cases were also GMS-GAGE depression cases. This suggests that the GAGE and AGECAT systems label a group of individuals as depressed, who would be classified as less severe cases of major depression according to DSM-IV criteria.

Chapter 4

Conclusions and Discussion

The present study sought to determine the organization of depressive symptoms in an elderly community sample. Precisely, we attempted to discover which symptoms were most important to the diagnosis of GMS-GAGE depression. Based on earlier work by Newman and Bland (submitted) which demonstrated the elevated prevalence of somatic symptoms in GMS-AGECAT cases of MDD compared to non-cases, we hypothesized that somatic symptoms of depression were principal to the diagnosis of GMS-GAGE major depressive disorders. This, however, was incorrect; the GMS-GAGE system diagnoses milder cases of depression, and places a greater emphasis on dysphoric symptoms than either cognitive or somatic symptoms of depression. These findings enhance the understanding of the GMS-GAGE clinical picture, which in turn contributes to more accurate estimates of prevalence, identification of etiologic factors, and ultimately the creation of effective treatment.

4.1 The role of somatic symptomatology in the diagnosis of GMS-GAGE depression

Earlier work by Newman and Bland (unpublished) demonstrated that somatic symptoms were more prevalent in GMS-AGECAT cases of depression than in non-cases. We hypothesized that these somatic symptoms of depression were important to the diagnosis of GMS-GAGE depression. In order to measure the effect of removing each of cognitive, somatic and dysphoric symptoms, GMS items deemed to

belong to each of these groups were recoded from present to absent. That is, symptoms were nullified one at a time, as well as in combination. Recoding all dysphoric symptoms of depression drastically reduced the number of GMS-GAGE cases of depression from 143 to 24. Dysphoric symptoms of depression were very influential to the GAGE diagnosis of depression. Nullifying somatic and cognitive symptoms did not drastically reduce the number of GAGE cases; somatic and cognitive symptoms of depression, then, played less important roles in the diagnosis of MDD. However, when the same analyses were conducted for the DSM-IV type depressive disorder, each of the symptom groups seemed to play an equally important role in the diagnosis of DSM-IV type depression.

Examination of the logistic regression coefficients reinforced the above; somatic and cognitive symptoms of depression were less important to the diagnosis of GMS-GAGE depressive disorders. The GMS-GAGE diagnoses of depression were regressed on the cognitive, somatic and dysphoric symptoms of depression. Dysphoric symptoms reached the greatest significance and were included in the final model. As mentioned earlier, this logistic regression model was not employed in order to predict cases of GMS-GAGE depression, but only to describe the relative importance of symptoms.

This is consistent with Downes et al. (1988) where data from the US-UK Cross-National Geriatric Community Study were re-examined. Hierarchical patterns in depressive symptomatology in the elderly population were explored, and Guttman Scales employed. Diagnoses of depression in a sample of 321 non-institutionalized elderly were based on the CARE, into which an early version of the GMS was

embedded. More frequent symptoms, such as somatic symptoms, were poor discriminators of depression in the elderly.

4.2 Estimates of prevalence for DSM-IV type and GMS-GAGE cases

In this study, the estimates of prevalence of current depression for both GMS-GAGE and DSM-IV type cases were consistent with published rates. The weighted prevalence of GMS-GAGE depression was 11.3%. This estimate is similar to the prevalence rates cited in the literature. For instance, Copeland et al. (1987) estimated the prevalence of GMS-AGECAT depression in an elderly, community-dwelling sample at 11.3%. The consistency lends reliability to the study.

The weighted prevalence rate for DSM-IV type depression is 6.6% in the present study. As well, using data from one site of the Epidemiologic Catchment Area (ECA) project, Weissman et al. (1985) estimated the prevalence of depression at 1.7%, using the Diagnostic Interview Schedule (DIS) and criteria from the third edition of the Diagnostic and Statistical Manual (DSM-III). The estimates for DSM-IV type depression were slightly higher than those published in the literature, which is unsurprising. The diagnostic criteria for the DSM-IV type depression used here were highly inclusive and used mild as well as severe symptoms.

The disparate estimates for GMS-GAGE and DSM-IV depression in the literature are reflected in this study. Since identical data aggregation and sampling techniques were used for each of GMS-GAGE and DSM-IV type depressive diagnoses, this consistency suggests that the published differences in GMS and DSM rates of depression, then, are not due to methodological issues, such as study design

or population. It follows that the differences in estimates of depression have most to do with the algorithm or diagnostic criteria.

Versions of the DSM and GMS instruments have both been validated against psychiatrists' diagnoses (Koenig et al., 1989; Copeland et al., 1988). Differences in estimates are not due to specific methodological aspects of the study, but to real differences in diagnostic criteria. The two diagnostic systems, GMS-GAGE and DSM-DIS, are measuring different concepts of "depression".

4.3 Comparing DSM-IV and GAGE diagnoses

Newmann (1989) reviewed empirical findings from 21 studies selected from community surveys conducted in the United States since 1970. From inconsistent reports on the relationship between depression and older age, she compared age-depression trends in studies employing standard screening scales (such as CES-D) to those employing clinical diagnostic measurement approaches (like the DSM-DIS system). She considered trends in depression in subjects at various stages in the adult age continuum (18+). Studies with standard screening scales, as a whole, suggest a curvilinear trend, with higher depression scores in the very youngest and the very oldest subjects. Studies using clinical diagnostic criteria to assess depression show a peak somewhat later in middle age, and dropping off in middle age. She considered various methodological and conceptual problems that plague research in this area. Overall, she proposed a closer study of the conceptualization and the measurement of depression to eliminate discrepancies, which obscure our understanding of the relationship between aging and depression. Results of the

present study further reflect the differences in prevalence estimates for DSM-IV type and GMS-GAGE depression.

4.4 Socio-cultural and historical considerations

A similar study was conceived with the U.S./ U.K. study (Gurland et al., 1983; Copeland et al., 1987b), a comparative analysis of the geriatric mental health in New York City and London using the Comprehensive Assessment and Referral Evaluation (CARE) diagnostic tool, related to the GMS. There were, however, no differences in depression's prevalence rate of depression in New York and London. Despite this, this work suggests the need for further in depth exploration of the complex manner in which late-life depression presents itself in the context of the social and cultural dimensions in which it exists, while also keeping in mind issues such as somatization, comorbidity and recall bias.

This work points to differences in the usage of diagnostic labels between European and American psychiatrists, and is a comparison of diagnostic concepts of psychiatrists across borders. There are socio-cultural bases for differences in the estimates of depression in studies employing European and American diagnostic criteria. Different histories for North America and Europe might have affected how psychiatrists in both areas define psychological or psychiatric constructs, including those considering depressive disorders. See Bland and Kolada (1988) for a historical discussion of the diagnosis of depression.

4.5 Limitations of the present study

The logistic regression method was used in this study in order to determine which of the DSM symptom groups were most important to the stage I diagnosis of GMS-GAGE depressive disorders. Typically, logistic regression methods are applied to determine risk factors. It is unconventional to regress the final diagnosis of GMS-GAGE depression on the symptoms of depression. Logistic regression methods here were used as a descriptive tool and not as a predictive tool, as it is typically used.

This study employed fairly inclusive criteria for each of the DSM symptom groups. That is, several GMS items related to each of the DSM groups. These very liberal criteria might overestimate inclusion in each symptom group, perhaps thereby reducing the specificity of the present study.

The high prevalence of probable cognitive impairment, evidenced by the high prevalence of GMS-GAGE organic disorders, may complicate the diagnosis of depression. Sections from the first chapter discuss how dementia may obscure the accurate diagnosis of depression in the elderly; various patterns of cognitive decline may conceal underlying affective illness.

As well, a reiteration of the difficulties measuring depression in the elderly is useful. In the present study, factors such as recall bias, response bias and misclassification bias might confuse over estimates of the prevalence of GMS-GAGE and DSM-IV type depression. All of these obfuscate our understanding of aging and depression

4.6 Relevance of the total study

These findings contribute to the knowledge of the manifestation of depression in the elderly, and have called into question previous understanding and expectations of the consequence of aging upon the development of depression. It seems intuitive that the risk of depression increases with the accumulation of losses throughout the life span. This, too, is a recurrent theme in the literature concerning the epidemiology of geriatric depressive disorders. It seems however that the presence of depressive disorders through the life span is more complicated. We hypothesized that the role of somatic symptoms was strong to the diagnosis of geriatric depressive disorders. For the GMS measured depression, it seems as though this is not the case, and that dysphoric symptoms of depression are in fact more important.

Further study then needs to be undertaken in order precisely define the clinical concept of depression. There are different measures and criteria of depressive disorders, such as the Geriatric Mental State (GMS) examination and the Diagnostic and Statistical Manual (DSM), which all claim to measure the same construct of depression. This is especially important in regards to the somatic presentations of depression in the elderly community-dwelling population.

Table 2.1 Number of GMS items in symptom groups

Symptom groups	Number of GMS items
Dysphoria (group 1)	13
sad (group 1a)	1
crying (group 1b)	2
observed sadness (group 1c)	3
hopelessness (group 1d)	2
permanence or relief of symptoms (group 1e)	5
Cognitive	16
loss of interest (group 2)	4
feelings of guilt or worthlessness (group 7)	3
decreased concentration or slowed thinking (group 8)	5
thoughts of death or suicidal ideation (group 9)	4
Somatic	24
appetite/weight disturbance (group 3)	8
sleep disturbance (group 4)	7
psychomotor agitation/retardation (group 5)	4
loss of energy (group 6)	5
Total	56

Table 3.1 Socio-demographic characteristics of the study sample (unweighted, n=1119)

Subgroup	Number	Proportion (%)	Edmonton Census Proportion (%)
Sex			
male	452	40.4	43.3
female	667	59.6	56.7
Age			
65-74	462	41.3	65.0
75-84	472	42.2	29.3
85+	185	16.5	5.7

Table 3.2 Prevalence of stage I GMS-GAGE diagnoses in study sample (%, weighted)

Disorder	Male		Female		Total	
	Case counts (unweighted)	Prevalence rate (weighted, %)	Case counts (unweighted)	Prevalence rate (weighted, %)	Case counts (unweighted)	Prevalence rate (weighted, %)
Organic Disorders	15	2.5	38	3.2	53	2.9
Schizophrenia and Resented Paranoia	1	0.0	1	0.2	2	.09
Mania	3	0.4	0	0.0	3	.16
Depression	**35**	**7.4**	**108**	**14.4**	**143**	**11.3**
Obsessional Neurosis	5	1.0	6	0.9	11	.93
Hypochondriasis	3	1.0	4	0.6	7	.82
Phobia	2	0.6	7	0.9	9	.78
Anxiety	1	0.2	12	2.2	13	1.4

Table 3.3 Frequencies of stage I GMS-AGECAT and stage I GMS-GAGE depression (unweighted)

		GMS-GAGE stage I depression		
		no	yes	total
AGECAT stage I depression	no	973	8	981
	yes	3	135	138
	total	976	143	1119

Table 3.4a Prevalence of stage I GMS-GAGE depression (%, weighted)

	Age group			Total
	65- 74	75-84	85 +	
Female	12.3	17.8	20.0	14.4
Male	6.7	9.1	8.3	7.4
Total	9.8	14.0	15.6	11.3
Female: Male	1.84	1.96	2.41	1.96

Table 3.4b Prevalence of DSM-IV type depression (%, weighted)

	Age group			Total
	65- 74	75-84	85 +	
Female	5.5	8.6	12.5	6.9
Male	2.7	3.1	8.3	3.1
Total	4.3	6.4	10.9	6.6
Female: Male	2.04	2.77	1.51	2.23

Table 3.5 Prevalence of DSM-IV depressive symptoms (weighted), n= 1119

DSM-IV Symptom Group	Prevalence (%)
Dysphoria	32.6
Group 1a (feeling sad)	23.2
Group 1b (crying)	23.9
Group 1c (observational reports of sadness)	6.2
Group 1d (hopelessness)	4.6
Group 1e (permanence/relief of symptoms)	9.4
Cognitive	15.6
Group 2 (loss of interest)	2.5
Group 7 (feelings of guilt or worthlessness)	3.2
Group 8 (concentration difficulties)	11.1
Group 9 (thoughts of death or suicidal ideation)	1.9
Somatic	50.7
Group 3 (weight or appetite disturbance)	10.1
Group 4 (sleep disturbance)	25.7
Group 5 (psychomotor agitation/retardation)	35.7
Group 6 (loss of energy)	20.9

Table 3.6 Prevalence of depressive symptom groups (weighted, %)

DSM-IV Symptom	GAGE (stage I) depression		DSM-IV type depression	
	absent	present	absent	present
Dysphoria	24.1	99.2	28.9	100
Group 1a (feeling sad)	15.1	85.8	20.0	80.0
Group 1b (crying)	16.5	81.1	21.0	74.6
Group 1c (observational)	1.4	43.3	4.2	42.4
Group 1d (hopeless)	1.0	32.3	2.9	33.9
Group 1e (permanence/relief)	0.7	76.4	7.5	42.4
Cognitive	11.2	50.4	11.8	84.7
Group 2 (loss of interest)	1.4	11.0	1.0	28.8
Group 7 (feelings of guilt or worthlessness)	2.2	11.0	2.7	11.9
Group 8 (thinking or concentration difficulties)	8.2	33.9	8.0	67.8
Group 9 (thoughts of death or suicidal ideation)	0.3	14.8	0.8	22.0
Somatic	46.3	85.0	47.9	100
Group 3 (weight/appetite disturbance)	8.5	22.8	7.6	54.2
Group 4 (sleep disturbance)	22.6	50.0	22.5	83.1
Group 5 (psychomotor retardation/agitation)	31.8	66.4	32.4	96.6
Group 6 (loss of energy)	16.4	55.1	17.0	89.8

Table 3.7 Prevalence of dysphoric symptom subgroups (weighted, %)

Subgroups of Dysphoria	GAGE (stage I) depression		DSM-IV type depression	
	absent	present	absent	present
Group 1a (feeling sad)	15.1	85.8	20.0	80.0
Group 1b (crying)	16.5	81.1	21.0	74.6
Group 1c (observational)	1.4	43.3	4.2	42.4
Group 1d (hopeless)	1.0	32.3	2.9	33.9
Group 1e (permanence/relief)	0.7	76.4	7.5	42.4

Table 3.8 Number of GMS-GAGE depression cases after nullifying symptom groups

Symptom group recoded	# of GAGE cases	# of GAGE cases lost	Number of DSM-IV type cases	#of DSM-IV cases lost
No groups recoded	143	0	74	0
Group 1 (dysphoria)	24	119	29	45
Group 1a (feeling sad)	137	6	47	27
Group 1b (crying)	122	21	47	27
Group 1c (observational reports of sadness)	134	9	42	32
Group 1d (hopeless)	142	1	42	32
Group 1e (permanence/relief)	81	62	46	28
Group 2 (loss of interest)	143	0	42	32
Group 3 (weight/appetite disturbance)	143	0	39	35
Group 4 (sleep disturbance)	140	3	33	41
Group 5 (psychomotor agitation/retardation)	143	0	30	44
Group 6 (loss of energy)	141	2	31	43
Group 7 (feelings of guilt/worthlessness)	142	1	43	31
Group 8 (diminished ability to think or concentrate)	143	0	36	38
Group 9 (thoughts of death or suicidal ideation)	143	0	45	29

Table 3.9 Number of GMS-GAGE depressive cases after nullifying or including symptom groups

Symptom Groups	Number of Cases
Symptom groups nullified	
dysphoria	24
cognitive	142
somatic	128
all groups	6
Symptom groups included	
dysphoria	137
cognitive	9
somatic	20
all groups	143

Table 3.10 Final logistic regression model using GMS-GAGE depression as outcome variable

	B	SE (B)	OR	95% CI	p value
GROUP 1a (feeling sad)	1.82	0.52	6.17	2.25-16.95	<0.001
GROUP 1b (crying)	1.72	0.50	5.63	2.11-14.73	<0.001
GROUP 1c (observational reports of sadness)	2.46	0.65	11.73	3.28-41.6	<0.0001
GROUP 1d (hopelessness)	2.64	0.79	13.95	3.03-304	<0.001
GROUP 1e (permanence/relief)	5.85	0.57	345.95	113.8-1059	<0.0001
GROUP 6 (loss of energy)	1.14	0.49	4.13	1.20-8.15	<0.01
GROUP 9 (suicide)	3.39	0.91	29.81	4.96-177.59	<0.001
AGE (continuous)	-0.02	0.03	0.98	0.14-6.95	0.49
SEX	0.53	0.50	1.69	0.64-4.53	0.28
constant	-5.35	2.59			0.039

Table 3.11 Comparison of univariate and multivariate risk estimates

DSM-IV symptom GROUPS	Univariate Analysis (from logistic regression)			Multivariate Analyses		
	OR	p-value	95% CI	OR	p-value	95% CI
GROUP 1 (dysphoria)	399.1	<0.01	57.99 - 2794			
GROUP 1a (feeling sad)	33.86	<0.01	20.10 –57.03	6.14	<0.01	2.13-17.74
GROUP 1b (crying)	18.77	<0.01	12.09-29.15	5.61	<0.01	2.13-14.77
GROUP 1c (observed sadness)	50.46	<0.01	27.42 – 92.80	14.17	<0.01	3.58-56.19
GROUP 1d (hopelessness)	38.09	<0.01	19.52 – 74.36	18.95	<0.01	3.72-96.53
GROUP 1e (permanence/relief)	480.1	<0.01	206 –1118	360.4	<0.01	114-1130
GROUP 2 (loss of interest)	8.67	<0.01	4.53 –39.30	0.31	0.283	0.038-2.60
GROUP 3 (appetite/ weight change)	3.35	<0.01	2.16 - 5.21	1.18	0.781	0.37-3.81
GROUP 4 (sleep disturbance)	2.83	<0.01	0.68 – 4.05	1.36	0.516	0.54-3.41
GROUP 5 (psychomotor agitation/retardation)	4.29	<0.01	2.92 - 6.31	0.56	0.388	0.15-2.07
GROUP 6(loss of energy)	6.31	<0.01	4.35 -9.13	5.10	0.018	1.32-19.73
GROUP 7 (feelings of worthlessness/guilt)	6.24	<0.01	3.07 - 12.68	3.14	0.238	0.47-20.95
GROUP 8 (decreased concentration/slowed thinking)	5.68	<0.01	3.85 - 8.41	1.81	0.289	0.61-5.38
GROUP 9 (suicidal ideation)	34.25	<0.01	13.77 - 85.19	30.19	<0.01	4.54-200

Table 3.12 Frequencies of DSM-IV type and GMS-GAGE depression (unweighted)

		GMS-GAGE depression		
		-	+	total
DSM-IV type depression	-	946	99	1045
	+	30	44	74
	total	976	143	1119

References

Alexopoulos G.S., Abrams R.C., Young R.C., and Shamoian C.A. (1988) Cornell Scale for Depression in Dementia. *Biological Psychiatry* **23**, 271-84.

Allen A. and Blazer D.G. (1991) Mood Disorders, in *Comprehensive Review of Geriatric Psychiatry* (Sadavoy J., Lazarus J.W., and Jarvik L.F., eds.), pp. 337-351, American Psychiatric Press, Washington DC.

American Psychiatric Association (1994) *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*, American Psychiatric Association, Washingtion D.C..

Angst J., Merikangas K., Scheidegger P., and Wicki W. (1990) Recurrent brief depression: a new subtype of affective disorder. *Journal of Affective Disorders* **19**, 87-98.

Ballard C., Bannister C., Solis M., Oyebode F., and Wilcock G. (1996) The prevalence, association and symptoms of depression amongst dementia sufferers. *Journal of Affective Disorders* **36**, 135-44.

Baron M., Klotz J., Mendlewicz J., and Rainer J. (1981) Multiple-threshold transmission of affective disorders. *Archives of General Psychiatry* **38**, 79-84.

Bland R.C. and Kolada J. (1988) Diagnostic issues and current criteria for schizophrenia in *Handbook of Schizophrenia, Volume 3; Nosology, Epidemiology and Genetics* (Tsuang M.T. and Simpson J.C., eds.), pp 1 - 14, Elsevier Science Publishers, New York..

Bland R.C., Orn H., and Newman S.C. (1988) Lifetime prevalence of psychiatric disorders in Edmonton. *Acta Psychiatrica Scandinavica* **77**, 24-32.

Blazer D.G., Woodbury M., Hughes D.C., George L.K., Manton K.G., Bachar J.R., and Fowler N. (1989) A statistical analysis of the classification of depression in a mixed community and clinical sample. *Journal of Affective Disorders* **16**, 11-20.

Blazer D.G. (1990) Epidemiology of Late-Life Depression and Dementia: A Comparative Study in *Review of Psychiatry; Volume 9* (Tasman A., Goldfinger S.M. and Kaufman C.A., eds.) pp. 210 -219, American Psychiatric Press, Washington, DC.

Blazer D.G., Burchett B., Service C., and George L.K. (1991) The association of age and depression among the elderly: an epidemiologic exploration. *Journal of Gerontology* **46**, M210-M215.

Blazer D.G. (1994) Epidemiology of Late-Life Depression, in *Diagnosis and Treatment of Depression in Late Life: Results of the NIH Consesus Development*

Conference (Schneider L.S., Reynolds C.F., Lebowitz B.D., and Friedhoff A.J., eds.), pp. 9-19, American Psychiatric Press, Washington, DC.

Box G.E.P. and Tidwell P.W. (1962) Transformation of the independent variables. *Technometrics* 4, 531-550.

Burke W.J., Nitcher R.L., Roccaforte W.H., and Wengel S.P. (1992) A prospective evaluation of the Geriatric Depression Scale in an outpatient geriatric assessment center. *Journal of the American Geriatrics Society* **40**, 1227-1230.

Burns A., Jacoby R., and Levy R. (1990) Psychiatric Phenomena in Alzheimer's Disease. III: Disorders of Mood. *British Journal of Psychiatry* **157**, 81-86.

Callahan C.M., Hendrie H.C., Dittus R.S., Brater D.C., Hui S.L., and Tierney W.M. (1994) Depression in late life: the use of clinical characteristics to focus screening efforts. *Journal of Gerontology* **49**, M9 – 14.

Canadian Study of Health and Aging Working Group (1994) Canadian Study of Health and Aging: study methods and prevalence of dementia. *Canadian Medical Association Journal* **150**, 899- 913.

Carlson G.A. and Kashani J.H. (1988) Phenomenology of major depression from childhood through adulthood: analysis of three studies. *American Journal of Psychiatry* **145**, 1222-1225.

Cooper J. E. (World Health Organization) (1994) *Pocket Guide to the ICD 10 Classification of Mental and Behavioral Disorders*. American Psychiatric Press, Washington, D.C..

Copeland J.R.M., Kelleher M.J., Kellet J.M., Gourlay A.J., Cowan D.W., Barron G., De Gruchy J., Gurland B.J., Sharpe L., Simon R., Kuriansky J., and Stiller P. (1975) Cross-national study of diagnosis of elderly psychiatric patients admitted to mental hospitals serving Queens County, New York and the former Borough of Camberwell, London. *British Journal of Psychiatry* **126**, 11-20.

Copeland J.R.M., Kelleher M.J., Kellett J.M., Gourlay A.J., Gurland B.J., Fleiss J.L., and Sharpe L. (1976) A semi-structured clinical interview for the assessment of diagnosis and mental state in the elderly: the Geriatric Mental State Schedule, I. Development and reliability. *Psychological Medicine* **6**, 439-449.

Copeland J.R.M., Dewey M.E., and Griffiths-Jones H.M. (1986) A computerized psychiatric diagnostic system and case nomenclature for elderly subjects: GMS and AGECAT. *Psychological Medicine* **16**, 89-99.

Copeland J.R.M., Dewey M.E., Wood N., Searle R., Davidson I.A., and McWilliam C. (1987) Range of mental illness among the elderly in the community: prevalence in Liverpool using the GMS-AGECAT package. *British Journal of Psychiatry* **150**, 815-823.

Copeland J.R.M., Gurland B.J., Dewey M.E., Kelleher M.J., Smith A.M.R., and Davidson I.A. (1987b) Is there more dementia, depression and neurosis in New York?: a comparative study of the elderly in New York and London using the computer diagnosis AGECAT. *British Journal of Psychiatry* **151**, 466-473.

Copeland J.R.M., Dewey M.E., Henderson A.S., Kay D.W.K., Neal C.D., Harrison M.A.M., McWilliam C., Forshaw D., and Shiwach R. (1988) The Geriatric Mental State (GMS) used in the community: replication studies of the computerized diagnosis AGECAT. *Psychological Medicine* **18**, 219-223.

Copeland J. R.M. and Dewey M.E. (1996) The AGECAT system (unpublished).

Cross-National Collaborative Group (1992) The changing rate of major depression. *Journal of the American Medical Association* **268**, 3098-3105.

Dewey M.E. and Copeland J.R.M. (1986) Computerized psychiatric diagnosis in the elderly: AGECAT. *Journal of Microcomputer Applications* **9**, 135-140.

Downes J.J., Davies A.D.M., and Copeland J.R.M. (1988) Organization of depressive symptoms in the elderly population: hierarchical pattern and Guttman Scales. *Psychology and Aging* **3**, 367-374.

Eaton W.W. and Kessler L.G. (1981) Rates of symptoms of depression in a national sample. *American Journal of Epidemiology* **114**, 528-38.

Eaton W.W., Kramer M., Anthony J.C., Dryman A., Shapiro S., and Locke BZ. (1989) The incidence of specific DIS/DSM-III mental disorders: data from the NIMH Epidemiologic Catchment Area Program. *Acta Psychiatrica Scandinavica* 79, 163-78.

Endicott J. and Spitzer R.L. (1978) A diagnostic interview: the Schedule for Affective Disorders and Schizophrenia. *Archives of General Psychiatry* **35**, 837-44.

Epstein L.J. (1976) Depression in the elderly. *Journal of Gerontology* **31**, 278-82.

Essau C.A. and Wittchen H.U. (1993) An overview of the composite international diagnostic interview (CIDI). *International Journal of Methods in Psychiatric Research* **3**, 79-85.

Evans S. and Katona C. (1993) Epidemiology of depressive symptoms in elderly primary care attenders. *Dementia* **4**, 327-33.

Finch E.J.L., Ramsay R. and Katona C.L.E. (1992) Depression and physical illness in the elderly. *Clinics in Geriatric Medicine* **8,** 275-287.

Fonda D. (1985) Parkinson's disease in the elderly: psychiatric manifestations. *Geriatrics* **40**, 109-112.

George L.K., Blazer D.G., Hughes D.C., and Fowler N. (1989) Social support and the outcome of major depression. *British Journal of Psychiatry* **154**, 478-85.

Green B.H., Copeland J.R.M., Dewey M.E., Saunders S.V., Davidson I.A., Sullivan C., and McWilliam C. (1992) Risk factors for depression in elderly people: a prospective study. *Acta Psychiatrica Scandinavica* **86**, 213-217.

Gupta K.L. (1993) Alcoholism in the elderly: Uncovering a hidden problem. *Postgraduate Medicine*, **93**, 203-6.

Gurland B.J., Fleiss J.L., Goldberg K., Sharpe L., Copeland J.R., Kelleher M.J., and Kellett J.M .(1976) A semi-structured clinical interview for the assessment of diagnosis and mental state in the elderly: the Geriatric Mental State Schedule: II. A factor analysis. *Psychological Medicine* **6**, 451-9.

Gurland B.J., Copeland J.R.M., Kuriansky J., Kelleher M., Sharpe L., and Dean L.L. (1983) *The Mind and Mood of Aging: The Mental Health Problems of he Community Elderly in New York and London.* New York, Haworth Press.

Heithoff K. (1995) Does the ECA underestimate the prevalence of late-life depression? *Journal of the American Geriatrics Society* **43**, 2-6.

Henderson A.S. (1994) Does aging protect against depression? (editorial) *Social Psychiatry and Psychiatric Epidemiology* **29**, 107-9.

Horwath E., Johnson J., Klerman G.L., and Weissman M.M. (1992) Depressive symptoms as relative and attributable factors for first onset major depression. *Archives of General Psychiatry* **49**, 817 - 823.

Hughes D.C., DeMallie D., and Blazer D.G. (1993) Does age make a difference in the effects of physical health and social support on the outcome of a major depressive episode? *American Journal of Psychiatry* **150**, 728-733.

Katon W., Kleinman A., and Rosen G. (1982) Depression and somatization: a review. Part II. *American Journal of Medicine* **72**, 241-7.

Katona C.L.E. (1992) The epidemiology of depression in old age: the importance of physical illness. *Clinical Neuropharmacology* **15**, 281A-282A.

Katona C.L.E. (1994) *Depression in Old Age*. John Wiley & Sons, Chichester.

Klerman G.L., Lavori P.W., Rice J., Reich T., Endicott J., Andreasen N.C., Keller M.B., and Hirschfield R.M. (1985) Birth-cohort trends in rates of major depressive disorder among of patients with affective disorder. *Archives of General Psychiatry* **42**, 689-93.

Klerman G.L. (1989) Depressive disorders. Further evidence for increased medical morbidity and impairment of social functioning. *Archives of General Psychiatry* **46**, 856-858.

Koenig H.G., George L.K., and Siegler I. (1988) The use of religion and other emotional-regulating coping strategies among older adults. *Gerontologist* **29**, 303-310.

Koenig H.G., Goli V., Shelp F., Cohen H.J., Meador K.G., and Blazer D.G. (1989) Major depression and the NIMH Diagnostic Interview Schedule: validation in medically ill hospitalized patients. *International Journal of Psychiatry in Medicine* **19**, 123-32.

Koenig H.G. and Blazer D.G. (1992) Epidemiology of geriatric affective disorders. *Clinics in Geriatric Medicine* **8**, 235-251.

Koenig H.G., Cohen H.J., Blazer D.G., Krishnan K.R.R., and Sibert T.E. (1993) Profile of depressive symptoms in younger and older medical inpatients with major depression. *Journal of the American Geriatrics Society* **41**, 1169-1176.

Krishnan K.R.R., Hays J.C., Tupler L.A., George L.K., and Blazer D.G. (1995) Clinical and phenomenological comparisons of late-onset and early-onset depression. *American Journal of Psychiatry* **152**, 785-788.

Lavori P.W., Klerman G.L., Keller M.B., Reich T., Rice J., and Endicott J. (1987) Age-period-cohort analysis of secular trends in onset of major depression: findings in siblings of patients with major affective disorder. *Journal of Psychiatric Research* **21**, 23-35.

Lyness J.M., Cox C., Curry J., Conwell Y., King D.A., and Caine E.D. (1995) Older age and the underreporting of depressive symptoms. *Journal of the American Geriatrics Society* **43**, 216-221.

McCullough P.K. (1991) Geriatric depression: atypical presentations, hidden meanings. *Geriatrics* **46**, 72-76.

Migliorelli R., Tesón A., Sabe L., Petracchi M., Leiguarda R., and Starkstein S.E. (1995) Prevalence and correlates of dysthymia and major depression among patients with Alzheimer's disease. *American Journal of Psychiatry* **152**, 37 – 44.

Millard P.H. (1983) Depression in old age. *British Medical Journal* **287**, 375-376.

Montgomery S.A. and Åsberg M. (1979) A new depression scale designed to be sensitive to change. *British Journal of Psychiatry* **134**, 382-389.

Morris J.N. (1957) *The Uses of Epidemiology*. Livingstone, Edinburgh.

Murphy E. (1983) The prognosis of depression in old age. *British Journal of Psychiatry* **142**, 111-119.

Newman S.C. and Dyck R.J. (1988) On the age-period-cohort analysis of suicide rates. *Psychological Medicine* **18**, 677-681.

Newman S.C. and Bland R.C. (unpublished) A comparison of GMS-AGECAT and DSM-III diagnosis of depression in an elderly community sample.

Newman S.C., Bland R.C., and Orn H.T. (submitted to the Canadian Journal of Psychiatry) The prevalence of mental disorders in the elderly in Edmonton: a community survey using GMS-AGECAT.

Newmann J.P. (1980) Aging and depression. *Psychology and Aging* **4**, 150-165.

Post F. (1972) The management and nature of depressive illness in late life: a follow-through study. *British Journal of Psychiatry* **121**, 393-404.

Radloff L.S. (1977) The CES-D scale: a self-report depression scale for research in the general population. *Applied Psychological Measurement* **1**, 385-401.

Rapp S.R., Parisi S.A., Walsh D.A., and Wallace C.E. (1988) Detecting depression in elderly medical inpatients. *Journal of Consulting and Clinical Psychology* **56**, 509-513.

Robins L.N., Helzer J.E., Croughan J., and Ratcliff K.S. (1981) National Institute of Mental Health diagnostic interview schedule: its history, characteristics and validity. *Archives of General Psychiatry* **38**, 381-389.

Robins L.N. and Reiger D.A. (1990) *Psychiatric Disorders in America*. New York: Free Press.

Romanoski A.J., Folstein M.F., Nestadt G., Chahal R., Merchant A., Brown C.H., Gruenberg E.M., and McHugh P.R. (1992) The epidemiology of psychiatrist-ascertained and DSM-III depressive disorders. *Psychological Medicine* **22**, 629-655.

Saunders P.A., Copeland J.R.M., Dewey M.E., Gilmore C., Larkin B.A., Phaterpekar H., and Scott A. (1993) The prevalence of dementia, depression and neurosis in later life: the Liverpool MRC-ALPHA Study. *International Journal of Epidemiology* **22**, 838-847.

Skoog I. (1993) *Mental Disorders in the Elderly: A Population Study in 85-year Olds*. University of Göteborg Press, Göteborg, Sweden.

Slater S.I., and Katz I.R. (1995) Prevalence of depression in the aged: formal calculations versus clinical facts. *Journal of American Geriatrics Society* **43**, 78-9.

Snaith R.P. (1987) The concepts of mild depression. *British Journal of Psychiatry* **160**, 387-393.

Snowdon J. (1990) The prevalence of depression in old age (editorial). *International Journal of Geriatric Psychiatry* **5**, 141-144.

Spaner D., Bland R.C., and Newman S.C. (1994) Major depressive disorder. *Acta Psychiatrica Scandinavica* **376**, 7-15.

Spitzer R.L., Endicott J., Fleiss J.L., and Cohen J. (1970) Psychiatric Status Schedule: a technique for evaluating psychopathology and impairment in role functioning. *Archives of General Psychiatry* **23**, 41 – 55.

Spitzer R.L., Endicott J., and Robbins E. (1978) Research Diagnostic Criteria: rationale and reliability. *Archives of General Psychiatry* **35**, 773-782.

Tannock C. and Katona C. (1995) Minor depression in the aged: concepts, prevalence and optimal management. *Drugs and Aging* **6**, 278-292.

Tohen M.T. and Goodwin F.K. (1995) Epidemiology of Bipolar Disorder in *Textbook of Psychiatric Epidemiology* (Tsuang M.T., Tohen K. and Zahner G., eds.), pp. 301-315, Wiley-Liss, Washington D.C..

Torgenson S. (1986) Genetic factors in moderately severe and mild affective disorders. *Archives of General Psychiatry* **43**, 222-226.

Warshaw M.G., Klerman G.L., and Lavori P.W. (1991) The use of conditional probabilities to examine age-period-cohort data: further evidence for a period effect in major depressive disorder. *Journal of Affective Disorders* **23**, 119-129.

Wattis J.P. (1981) Alcohol problems in the elderly. *Journal of the American Geriatrics Society* **29**, 131-134.

Weissman M.M., Gershon E.S., Kidd K.K., Prusoff B.A., Leckman J.F., Dibble E., Hamovit J., Thompson W.D., Pauls D.L., and Guroff J.J. (1984) Psychiatric disorders in the relatives of probands with affective disorders. *Archives of General Psychiatry* **41**, 13-21.

Weissman M.M., Myers J.K., Tischler G.L., Holzer C.E., Leaf P.J., Orvaschel H., and Brody J.A. (1985) Psychiatric disorders (DSM-III) and cognitive impairment among the elderly in a U.S. urban community. *Acta Psychiatrica Scandinavica* **71**, 366-379.

Weissman M.M., Leaf P.J., Tischler G.L., Blazer D.G., Karno M., Livingstone Bruce M., and Florio L.P. (1988) Affective disorders in five United States communities. *Psychological Medicine* **18**, 141-153.

Weissman M.M., Livingstone Bruce M., Leak P.J., Florio L.P., and Holzer C. (1991) Affective Disorders in *Psychiatric Disorders in America: The Epidemiologic Catchment Area Study* (Robins L.N. and Reiger D.A., eds.) pp. 53-80, Free Press, New York.

Wing J.K., Cooper J.E., and Sartorius N. (1974) *Measure and Classification of Psychiatric Symptoms: An Instructional Manual for the PSE and CATEGO Programs* Cambridge: Cambridge University Press.

Yesavage J.A., Rose T.L., Lum O., Huang V., Adey M., and Leirer V.O. (1983) Development and validation of a geriatric depression screening scale: a preliminary report. *Journal of Psychiatric Research* **17**, 37-49.

Appendix I –Geriatric Mental State (GMS) items

Coding legend in square brackets: 0 - symptom not present
1 - symptoms present and mild
2 - symptom present and severe
8 - no reply
9 - item not asked

GROUP 1A – FEELING SAD [1 items]
Question 21.1: Have you been sad (depressed, miserable, in low spirits, blue) recently?
Depressed mood. [012 89]

GROUP 1B – CRYING OR FEELING LIKE CRYING [2 items]
Question 22.1: Have you cried at all?
Has cried. [012 89]
Question 23.1: Have you felt like crying without actually weeping?
Has felt like crying. [012 89]

GROUP 1C – OBSERVATIONAL REPORTS OF SADNESS [3 items]
Question 33.3: Looks or sounds sad, gloomy, mournful or depressed. [012 89]
Question 33.5: Eyes moist: tearful or crying. [012 89]
Question 164.1: Observation: Uncontrollable short bouts of crying. [012 89]

GROUP 1D – HOPELESSNESS [2 items]
Question 29: Is there something about the future that you do not like to think about?
Is pessimistic or future seems bleak or can see no future at all, or future seems unbearable. [01 89]
A general feeling of hopelessness, despair. [01 89]

GROUP 1E – PERMANENCE OR RELIEF OF DEPRESSION [5 items]
Question 24: Is the depression/crying/ feeling like crying there most of the time? How long does it last? How long have you had it?
Depression, crying or feeling like crying lasts longer than just the occasional few hours. [01 89]
Depression, crying or feeling like crying is present most of the time. [01 89]
Present for at least two continuous weeks in the last month. [01 89]
Question 27: What relieves the depression? For how long?
Nothing relieves. [01 89]
Depression not relieved for several hours at a time by having visitors, entertainment. [012 89]

GROUP 2 – LOSS OF INTEREST [4 items]
Question 113: How is your interest in things?
Has less interest in things in the last month than used to have. [012 89]
Question 114: What have you enjoyed doing recently?
Almost nothing enjoyed. [012 89]
Question 115: When did you notice this loss of interest/enjoyment? When did it start? Has it been present recently? For how long? Is it there most days?
Falling off of interest/enjoyment has occurred only within the last 3 months. [01 89]
Loss of interest or enjoyment most days for two weeks in the last month. [012 89]

GROUP 3 – APPETITE REDUCTION OR WEIGHT LOSS [8 items]
Question 51: What has your appetite been like? Do you enjoy your food? Have you been eating more or less than usual?
Diminution in the desire for food. [012 89]
Increase in the desire for food. [012 89]

Question 52: Why is that? Has it been like that most days in the last month?
Poor appetite in the absence of known medical condition and without nausea. [01 89]
Poor appetite present most days for at least two weeks in the last month. [01 89]
Increased appetite present most days for at least two weeks in the last month. [01 89]
Question 53: Have you lost any weight during the past three months? (Have you gained weight?)
About how much? How much in the past month?
Lost 10 lbs. or more in the past three months. [01 89]
Lost 10 lbs. or more within the past month. [01 89]
Gained 10 lbs. in the past month. [01 89]

GROUP 4 - DIFFICULTY FALLING ASLEEP, HYPERSOMNIA OR INSOMNIA [7 items]
Question 54: Have you had trouble sleeping recently? (Have you taken anything to help you sleep?)
How long has it been going on for? What used to happen?
Trouble falling or staying asleep, or taking medication or alcohol for sleep. [012 89]
Has insomnia for most of the nights and sleeps mainly during the day. [012 89]
Marked insomnia most nights for at least two weeks in the last month. [012 89]
Marked excessive sleep most nights for at least two weeks in the last month. [012 89]
Question 55: Have you had any difficulty falling asleep? Do you lie awake for long periods of time?
Difficulty falling asleep. [01 89]
Question 56: Is your sleep interrupted during the night?
Sleep interrupted during the night? [012 89]
Question 57: Have you recently been waking up early in the morning and found it impossible to get back to sleep? What time would that be? Is that your usual time? How often had it happened?
Awakens about two hours or more before normal time of awakening and cannot get back to sleep, for most nights for at least two weeks in the last month. [01 89]

GROUP 5 - PSYCHOMOTOR RETARDATION/AGITATION [4 items]
Question 71: Do you seem (are you) slowed down in your (physical) movements at all?
Subjectively slowed in movements. [012 89]
Question 75: Is there any time of the day when this is at its worst? Is it present most days?
Slowness is present most days for at least two weeks. [012 89]
Question 78:Obsservation: Very slow in all movements. [012 89]
Question 159:Behavioural rating: Very slow in all movements. [012 89]

GROUP 6 - ANERGIA [5 items]
Question 72:Have you had too little energy (to do the things you want to do)? How long have you had that for? Are you like that most days?
Listlessness or subjective restriction of energy. [012 89]
Present most days for at least two weeks. [012 89]
Question 74: Did this (slowing, loss of energy, reduced activity) start in the last three months or perhaps get worse in the last three months?
Started or became worse in the last three months. [01 89]
Question 76: What about when someone visits you or you have to go out? Does that make any difference?
Does not lift with usually pleasant activities. [01 89]
Question 77: Have you actually been sitting around a lot (or spending more time in bed than usual) because of lack of energy?
Sits or lies around because of lack of energy. [012 89]

GROUP 7 - FEELINGS OF WORTHLESSNESS OR EXCESSIVE GUILT [3 items]
Question 104: Do you tend to blame yourself or feel guilty about anything? What? (Do you mean you actually feel worthless?) (How long have you felt like this?) Is it reasonable?
Obvious excessive guilt or self-blame over past and present peccadilloes. [012 89]
Felling worthless or severe guilt most days for at least two weeks. [012 89]
Worthlessness or guilt or delusional intensity, most days. [012 89]

GROUP 8 - CONCENTRATION PROBLEMS, THINKING DIFFICULTY [5 items]
Question 63:Do your thoughts get mixed up (muddled)? (So that you cannot get them sorted out?) (Can you think clearly?) (How long has that bothered you?) (How often?)
Feeling of being muddled. [012 89]
Question 64: Do you find it difficult to make up your mind (to make decisions)? (How long has that bothered you? How often?)
Feels indecisive. [012 89]
Muddled thinking or indecisiveness has been present most days, for at least two weeks. [012 89]
Question 118:Do you read? Can you concentrate on a television (radio, film) program? (Can you watch it all the way through?) (How long has that bothered you? How often?)
Difficulty concentrating on entertainment. [012 89]
Question 119: Observation: obvious difficulty in concentrating on interview. [012 89]

GROUP 9 - SUICIDAL IDEATION, THOUGHTS OF DEATH OR SUICIDE ATTEMPT [4 items]
Question 31: When was the last time that you felt that you would rather be dead? Have you felt like that recently?
In the last month. [01 89]
Has felt a wish to be dead for at least two weeks in the last month. [012 89]
Question 32: Did you actually try anything? When was that? What did you do? (Or plan to do?) Why do you think you felt that way?
Has done something or planned to do something about killing self. [01 89]
Has rejected suicide but has wished to be dead because life is a burden. [01 89]